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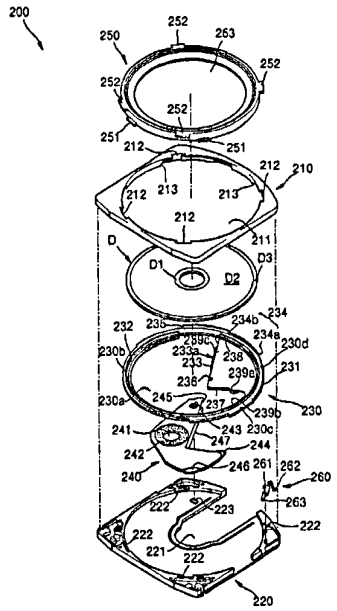
(54) Title: DISK CARTRIDGE




(57) Abstract: A disc cartridge includes a case for accommodating a disc and having an aperture hole formed in one surface of the case so that a recording/reproducing apparatus access a recording surface of the disc and an open hole formed in the other surface to be open to the outside, a shutter for opening/shutting the aperture hole, installed in the case, a disc holder installed at the side of the open hole to be capable of moving up and down, and covering a gap between an outer circumference of the disc and an inner surface of the open hole when the disc holder descends, and a shutter driving mechanism for moving the shutter so that the aperture hole is open/shut.

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# DISC CARTRIDGE

## Technical Field

The present invention relates to a disc cartridge for accommodating a disc that is an information recording/reproducing medium and protecting a recording surface thereof from contaminants such as dust or finger print.

## Background Art

In general, disc cartridges accommodate discs that are information recording/reproducing media and are loaded in disc drives. As shown in FIG. 1, a conventional disc cartridge 100 includes upper and lower cases 103 and 101 for accommodating a disc D, and a shutter 110 rotatably installed in the lower case 101 for selectively opening and shutting an aperture hole 102 formed in the lower case 101 so that a pickup (not shown) of a disc drive can access the disc D. Reference numeral 103b denotes an open hole formed in the upper case 103 for exchange and clamping of the disc D. Reference numeral 103a denotes an escape prevention lever installed at the upper case 103 to be capable of sliding to prevent the disc D from escaping through the open hole 103b. Thus, when the disc D is installed, the escape prevention lever 103a is pushed back not to interfere with the disc D. when the installation is completed, the escape prevention lever 103a is pushed forward as shown in the drawing so that a tip end portion of the escape prevention lever 103a prevents the disc D from escaping through the open hole 103b.

When the disc cartridge 100 having the disc D is inserted into a disc drive (not shown), as shown in FIG. 2A, an opening lever 120 installed at the disc drive first pushes a locking piece 111a so that a protrusion 111c of the shutter 110 and a groove 101a of the lower case 101 are unlocked. Next, as shown in FIG. 2B, the opening lever 120





pushes an interference piece 111b to pivot around left and right rotation shafts 110a. The shutter 110 is installed to capable of rotating around the left and right rotation shafts 110a and includes first and second shutter portions 111 and 112 that are engaged with each other through an engagement teethed portion 113. When the first shutter portion 111 integrally formed with the interference piece 111b rotates clockwise, the second shutter portion 112 rotates counterclockwise so that the first and second shutter portions 111 and 112 are separated away from each other and the aperture hole 102 is open.

Then, a turntable (not shown) and a clamper (not shown) of the disc drive enter through the aperture hole 102 and the open hole 103b, respectively, to clamp the disc D. Next, the pickup accesses a recording surface of the disc D to record and/or reproduce information. Although not shown in the drawings, a torsion spring for elastically biasing the first shutter portion 111 counterclockwise, that is, in a direction in which the aperture hole 102 is shut, is installed at the rotation shaft 110a between the first shutter portion 111 and the bottom surface of the lower case 101. Accordingly, when a force applied by the opening lever 120 is removed, the shutter 110 is returned to the original shut state.

However, in the above-described structure, a possibility that the recording surface is contaminated by dust coming through the open hole 103b of the upper case 103 is high. Of course, since the upper surface of the disc D facing the open hole 103b is not a recording surface, the contamination by dust is not direct. However, when dust comes in and accumulates on the shutter 110, the dust on the shutter 110 adheres to the recording surface of the disc D during the opening/shutting operation.

Also, the shutter 110 is installed between the upper and lower cases 103 and 101 and the disc D is placed on the shutter 110, during the opening/shutting operation of the shutter 110, the recording surface

of the disc D (a lower surface of the disc in the drawing) and the shutter 110 make a surface contact, so that a damage such as scratches may be given to the recording surface of the disc D. Therefore, a structure which can prevent intrusion of dust and protect the recording surface of the disc D from dust is needed.

Disclosure of the Invention

To solve the above-described problems, it is an object of the present invention to provide a disc cartridge having an improved structure by which dust is prevented from coming into the case and the recording surface of the disc can be protected during the opening/shutting operation of the shutter.

To achieve the above object, there is provided a disc cartridge comprising a case for accommodating a disc and having an aperture hole formed in one surface of the case so that a recording/reproducing apparatus access a recording surface of the disc and an open hole formed in the other surface to be open to the outside, a shutter for opening/shutting the aperture hole, installed in the case, a disc holder installed at the side of the open hole to be capable of moving up and down, and covering a gap between an outer circumference of the disc and an inner surface of the open hole when the disc holder descends, and a shutter driving mechanism for moving the shutter so that the aperture hole is shut when the disc holder descends.

To achieve the above object, there is provided a disc cartridge comprising a case for accommodating a disc and having an aperture hole formed in one surface of the case so that a recording/reproducing apparatus access a recording surface of the disc and an open hole formed in the other surface to be open to the outside, a ring rotator rotatably installed at the case, and on which an outer circumference of the disc is accommodated, a shutter for opening/shutting the aperture hole, installed in the case, a disc holder installed at the side of the open





hole of the case to be capable of moving up and down, and covering a gap between an outer circumference of the disc and an inner surface of the open hole when the disc holder descends, and a rotation driving mechanism for rotating the ring rotator.

Brief Description of the Drawings

FIG. 1 is a perspective view showing a conventional disc cartridge;

FIGS. 2A and 2B are plan views showing the shutter opening/shutting state of the disc cartridge shown in FIG. 1;

FIG. 3 is an exploded perspective view of a disc cartridge according to a first preferred embodiment of the present invention;

FIG. 4 is a perspective view showing an assembled state of FIG. 3;

FIGS. 5A and 5B are views showing descending and ascending states of a disc holder in the disc cartridge shown in FIG. 3;

FIGS. 6A through 6D are views showing the state in which the shutter is unlocked and the aperture hole is opened in the disc cartridge shown in FIG. 3;

FIGS. 7A and 7B are views showing the state in which the shutter is locked and the aperture hole is closed in the disc cartridge shown in FIG. 3;

FIGS. 8A and 8B are views showing the state in which the disc holder ascends in the disc cartridge shown in FIG. 3;

FIGS. 8C and 8D are views showing the state in which the disc holder descends in the disc cartridge shown in FIG. 3;

FIG. 9 is a view showing the rear surface of a circular shutter member in the disc cartridge shown in FIG. 3;

FIG. 10 is a view showing a modified example of the disc holder shown in FIG. 3;

FIG. 11 is an exploded perspective view of a disc cartridge according to a second preferred embodiment of the present invention;

FIGS. 12A and 12B show the opening and shutting operation of the shutter in the disc cartridge shown in FIG. 11;

FIG. 13 is a view showing the engagement of the ring rotator and the shutter in the disc cartridge shown in FIG. 11;

FIG. 14 is a view showing the structure of installation of the disc holder shutter in the disc cartridge shown in FIG. 11;

FIGS. 15A and 15B are views showing the state in which the disc holder descends, in disc cartridge shown in FIG. 11;

FIGS. 16A and 16B are views showing the state in which the disc holder ascends, in disc cartridge shown in FIG. 11;

FIG. 17 is a view showing the state in which the disc holder is rotated out of the open hole, in the disc cartridge shown in FIG. 11;

FIG. 18 is a view showing the process in which the support member coupled to the inclined rail is elastically separated, in the disc cartridge shown in FIG. 11;

FIG. 19 is a view showing the state in which the groove of the ring rotator is exposed through the exposing portion of the case, in the disc cartridge shown in FIG. 11;

FIG. 20 is a view for explaining the relationship between the shutter and the exposing portion, in the disc cartridge shown in FIG. 11; and

FIG. 21 is a view showing an example of modification of the disc holder shown in FIG. 11.

Best mode for carrying out the Invention

FIGS. 3 and 4 show a disassembled state and an assembled state of a disc cartridge according to a first preferred embodiment of the present invention. Referring to the drawings, a disc cartridge includes a case formed of upper and lower cases 210 and 220 for accommodating





a disc D, a shutter for opening and shutting an aperture hole 221 formed in the lower case 220 under the disc D, and a disc holder 250 installed between the upper and lower cases 210 and 220 to be capable of ascending and descending. The upper case 210 is coupled to the upper surface of the lower case 220 and an open hole 211 open to the outside is formed in the upper case 210.

The shutter includes a circular shutter member 230 rotatably installed at the lower case 220 and having an accommodation surface 232 on which an outer circumference D3 of the disc D is accommodated, and a pivot shutter member 240 installed to be capable of pivoting within a cut portion 230a of the circular shutter member 230. Reference numeral 243 denotes a coupling hole formed in the pivot shutter member 240 to be coupled to a pivot shaft 223 provided at the lower case 220. The aperture hole 221 is opened or shut through the cut portion 230a according to the movement of the circular shutter member 230 and the pivot shutter member 240. A detailed opening/shutting operation thereof will be described later.

The disc holder 250 ascends in the state in which the disc cartridge 200 is inserted into a disc drive (not shown) and descends when it is ejected to the outside. When the disc holder 250 descends, the disc holder 250 closely contacts an outer circumference D3 of the disc D and an outer circumference 230b of the circular shutter member 230, as shown in FIG. 5A. This operation performs a sort of a cover function so that the recording surface of the disc D is prevented from being contaminated by the dust coming through the open hole 211 and accumulating in a gap g between the outer circumference 230b of the circular shutter member 230 and the outer circumference D3 of the disc D. In other words, an interval between the outer circumference of the disc D and the inner surface of the open hole 211 is covered to prevent dust from intruding therein. Also, as the disc holder 250 descends, since the disc holder 250 presses the disc D toward the accommodation

surface 232 of the circular shutter member 230, the disc D is firmly held and is not moved. The disc holder 250 has a ring shape in which a through hole having a diameter greater than the diameter of the non information area D1 at the inner circumference side of the disc D and less than the diameter of the outermost circumference of the disc D is formed at the center thereof. Thus, when the disc holder 250 closely contacts the circumference of the upper surface of the disc D, the upper surface of the disc at the inner side of the through hole is exposed through the open hole 211.

An elevation mechanism for ascending and descending the disc holder 250, and a shutter driving mechanism for moving the circular shutter member 230 and the pivot shutter member 240 to open and shut the open hole 211, are described below.

First, the shutter driving mechanism includes a gear portion 231 provided at the circular shutter member 230 and an engagement unit for making the pivot shutter member 240 to pivot by being engaged with the rotation of the circular shutter member 230, and a locking unit for selectively locking the circular shutter member 230.

The gear portion 231 is formed to be engaged with an opening gear 300 (refer to FIG. 6A) installed in the disc drive when the disc cartridge 200 is inserted into the disc drive. Since the opening gear 300 is in a state of being fixed and the circular shutter member 230 is in a state of being rotatable, as shown in FIGS. 6B and 6C, when the opening gear 300 and the circular shutter member 230 are engaged together, the circular shutter member 230 rotates as the disc cartridge 200 is inserted into.

The engagement unit includes first and second push portions 237 and 238 provided at the circular shutter member 230 so that the pivot shutter member 240 can be pushed clockwise and counterclockwise. Thus, in the state in which the aperture hole 221 is closed, as shown in FIG. 6A, as the circular shutter member 230 begins to rotate clockwise,





the first push portion 237 pushes a first pressing surface 244 of the pivot shutter member 240 to rotate clockwise. As a result, the aperture hole 221 is opened as shown in FIG. 6C. Then, when the circular shutter member 230 rotates counterclockwise from the above state, as shown in FIG. 7A, the second push portion 238 contacts a second pressing surface 245 of the pivot shutter member 240 and pushes it counterclockwise, as shown in FIG. 7B. As a result, the aperture hole 221 is closed and returns to its original state shown in FIG. 6A.

The locking unit includes a locking lever 260 rotatably installed at the lower case 220. As shown in FIG. 3 and FIGS. 6A through 6D, the locking lever 260 includes a locking protrusion 261 coupled to the gear portion 231, an elastic piece 262 for providing an elastic force so that the locking protrusion 261 can be rotated in a direction in which the locking protrusion 261 is coupled to the gear portion 231, and an interference protrusion 263 interfered with the opening gear 300 when the disc cartridge 200 is inserted into the disc drive. Thus, in the state in which an external force is not applied, since the locking protrusion 261 is caught by the gear portion 231 by the elastic force of the elastic piece 262, the circular shutter member 240 cannot be rotated.

However, when the disc cartridge 200 is inserted into the disc drive, the interference protrusion 263 is interfered with the opening gear 300 to rotate, as shown in FIG. 6B. Then, the locking protrusion 261 is separated from the gear portion 231 so that locking is removed and the circular shutter member 230 is in a state of being rotatable. In this state, as the gear portion 231 and the opening gear 300 are engaged with each other, the circular shutter member 230 is rotated. Reference numeral 301 denotes a gear surface of the opening gear 300 engaged with the gear portion 231. Reference numeral 302 denotes a first hooking protrusion inserted into a first hooking groove 230c of the circular shutter member 230 at the initial stage in which the disc cartridge 200 is inserted into the disc drive and slightly rotating the

circular shutter member 230 until the gear surface 301 is engaged with the gear portion 231. Reference numeral 303 denotes a second hooking protrusion for restricting the free rotation of the circular shutter member 230 by being inserted into a second hooking groove 230d of the circular shutter member 230 when the disc cartridge is completely inserted into the disc drive. Here, the length L2 of a contact surface of the interference protrusion 263 contacting the gear surface 301 of the opening gear 300 is preferably formed to be longer than the length L1 between teeth of the gear surface 301, as shown in FIG. 6D. Otherwise, since the interference protrusion 263 is repeatedly caught by the teeth as the gear surface 301 passes, the disc cartridge 200 is not be able to smoothly inserted and noise is generated due to the repeated collisions.

Next, the elevation mechanism, as shown in FIGS. 3 and FIGS. 8A through 8D, includes a rub 251 protruding from the disc holder 250, third and fourth push portions 234 and 235 provided at the circular shutter member 230 to rotate the disc holder 250 by pushing the rib 251, and first and second inclined surfaces 222 and 213 provided at each of the lower and upper cases 220 and 210 so that, when the disc holder 250 rotates, the rib 251 slides and ascends. Thus, as shown in FIGS. 8A and 8B, when the circular shutter member 230 rotates in a direction in which the aperture hole 221 is open, the third push portion 234 pushes the rib 251 to ascend along the first inclined surface 222. When the circular shutter member 230 rotates in a direction in which the aperture hole 221 is closed, as shown in FIGS. 8C and 8D, the fourth push portion 235 pushes the rib 251 to descend along the second inclined surface 213. Here, the third push portion 234 includes a first push surface 234a pushing the rib 251 to ascend along the first inclined surface 222 as the circular shutter member 230 rotates, and a second push surface 234b allowing the rib 251 to closely contact a stopper 222a provided at the upper end of the first inclined surface 222. Thus, when circular shutter member 230 rotates, the first push surface 234a first





pushes the rib 251 toward the upper end of the first inclined surface 222 and then the second push surface 234b makes the rib 251 to closely contact the stopper 22a and locks it not to move.

Meanwhile, a cut groove 212 through which the rib 251 can pass when the disc holder 250 is inserted through the open hole 211 is formed in the upper case 210. An auxiliary rib 252 located to block the cut groove 212, as shown in FIG. 8D, when the rib 251 passes through the cut groove 212, rotates, and descends along the second inclined surface 213 is provided at the disc holder 250. Thus, when the disc holder 250 is inserted through the open hole 211, the auxiliary rib 252 is located in the cut groove 212 to block an entrance through which dust can enter. For example, to replace the disc D, the disc holder 250 is disassembled by rotating the disc holder 250 such that the rib 215 fits to the cut groove 212.

Step surfaces 239a, 239b, and 239c, and 244, 246, and 247, vertically folded onto one another are provided at the position in which the circular shutter member 230 closely contacts the pivot shutter member 240. The step surface 244 is a first pressing surface pressed by the first push portion 237, as describe above, and also has a function of a step surface to be folded under the step surface 239a. The step surface 246 of the pivot shutter member 240 is disposed under the step surface 239b of the circular shutter member 230. The step surface 247 is disposed under the step surface 239c. The two shutter members 230 and 240 are folded at several positions to prevent the pivot shutter member 240 lifting during the opening and shutting operations and scratching the recording surface of the disc D and reduce deformation when a user presses a shutter through the aperture hole 221. That is, when the circular shutter member 230 and the pivot shutter member 240 closely contact each other as the aperture hole 221 is closed, the circular shutter member 230 and the pivot shutter member 240 are tied together so that, when an external force is applied, deformation of the

shutter is prevented compared to the state in which they are separated. Also, a protruding piece 233 is formed at the lower portion of the step surface 239c to form a coupling groove 233a. The step surface 247 is inserted into the coupling groove 233a as a coupling protrusion. The protruding piece 233 provides a function of tying the two shutter members 230 and 240 together with respect to an external force in the vertical direction. Also, since the protruding piece 233 which protrudes toward the aperture hole 221 viewed from the rear surface, as shown in FIG. 9, it provides a function of a handle to rotate the circular shutter member 230 by hooking a finger of a user when needed. Thus, if a user wants to manually open the shutter, the protruding piece 233 is rotated by a finger in the state in which the interference piece 263 of the locking lever 260 is pressed.

In the present preferred embodiment, a first connecting hole 253 connected to the open hole 211 is formed in the disc holder 250 so that a clamper (not shown) of the disc drive can enter. A second connection hole 241 for connecting the center hole of the disc D and the aperture hole 221 in the closed state is formed in the pivot shutter member 240. A non woven fabric 242 enclosing the second connection hole 241 and closely contacting a non information are D1 at the inner circumference side of the disc D is provided. Thus, since the open hole 211 and the aperture hole 221 are formed in the upper and lower cases 210 and 220, respectively, although the disc D accommodated therein is exposed outside, the disc holder 250 blocks a passage of dust that may intrude toward the recording surface of the disc D through the outer circumference D3 of the disc D. Also, the non woven fabric 242 blocks a passage of dust that may intrude toward the recording surface of the disc D between the non information area D1 at the inner circumference side of the disc D. Accordingly, the recording surface, that is, an information area D2, can be protected safely. Of course, of the connection hole is not originally formed in the pivot shutter member 240,





the non woven fabric 242 is not needed. In this case, since dust coming through the open hole 211 and the center hole of the disc D accumulates on the pivot shutter member 240 that is blocked may contaminate the recording surface during pivot, it is better to form the connection hole 241 to fit to the center hole of the disc D.

However, when the open hole 211 is blocked, it is preferable not to form the connection hole in the pivot shutter member 240. That is, in the present preferred embodiment, although a hole 253 is formed in the disc holder 250 so that the clamper of the disc drive can enter, even when a disc holder 250′ having no hole as shown in FIG. 10 is adopted, it is effective to block the shutter side to prevent contamination by dust. Instead, in this case, since the clamper cannot enter the disc drive, the clamping member 270 must be installed at the inner side of the disc holder 250′ as shown in the drawing. The clamping member 270 includes a ring member 271 installed at the inner surface of the disc holder 250′, a clamping holder 272 supported by the outer circumference of the ring member 271, and an iron piece 273 installed at the clamping holder 272 to apply a magnetic attraction with a magnet installed at a turntable (not shown) in the disc drive.

Reference numeral 236 denotes a protrusion protruding to support the non information area D1 at the inner circumference side of the disc D and having a function of preventing contact between the shutter and the recording surface of the disc D.

The disc cartridge accommodating the disc D is inserted into the disc drive in the state in which the circular shutter member 230 and the pivot shutter member 240 block the aperture hole 221 as shown in FIG. 6A and the disc holder 250 covers a gap g between the outer circumference D3 of the disc D and the outer circumference 230b of the circular shutter member 230 as shown in FIG. 5A. That is, all passages through which dust can intrude toward the recording surface, that is, the information area D2, of the disc D accommodated in the disc cartridge

200 are blocked. When the disc cartridge is inserted, as shown in FIG. 6B, the opening gear 300 installed at the disc drive presses the interference protrusion 263 of the locking lever 260 to unlock the locking protrusion 261 and the gear portion 231. Next, the first hook protrusion 302 of the opening gear 300 is caught by the first hooking groove 230c of the circular shutter member 230. When the disc cartridge 200 is inserted into the disc drive in this state, the gear surface 301 of the opening gear 300 is engaged with the gear portion 231 of the circular shutter member 230 and the circular shutter member 230 rotates clockwise, as shown in FIG. 6C. Here, since only the outer circumference D3 of the disc D contacts the accommodation surface 232 of the circular shutter member 230, the information area D2 of the recording surface is hardly damaged during the shutter opening/shutting operation.

As the circular shutter member 230 rotates, the aperture hole 221 is opened and simultaneously the disc holder 250 ascends. That is, as the circular shutter member 230 rotates, as shown in FIGS. 6B and 6C, the first push portion 237 pushes the first pressing surface 244 of the pivot shutter member 240 to pivot in the same direction and open the aperture hole 221. Also, in this process, as shown in FIGS. 8A and 8B, the third push portion 234 pushes the rib 251 of the disc holder 250 to ascend toward the upper end of the first inclined surface 222. Thus, as shown in FIG. 5B, the disc holder 250 is separated from the disc D and the disc D can rotate freely. In this state, the turntable and the clamper of the disc drive enter through the aperture hole 221 and the first connection hole 253, respectively, to clamp the disc D and then recording and reproducing operations are performed with respect to the disc D as the turntable rotates. In the meantime, the height that the disc holder 250 separated from the disc D ascends is preferably designed to be double the height that the disc D accommodated on the turntable ascends. That is, when the disc D is clamped, it is raised





toward the clamper by the turntable about 1 mm from the accommodation surface 232. Thus, to prevent interference with the disc D, the height that the disc holder 250 ascends is preferably set to be about 2 mm that is double the above height.

In contrast, when the recording/reproducing operation is completed, the turntable and the clamper escape from the disc cartridge 200 and clamping is removed. In this state, as the disc cartridge is ejected from the disc drive, the circular shutter member 230 and the pivot shutter member 240 return to their original positions and the aperture hole 221 is closed. That is, as shown in FIGS. 7A and 7B, the gear portion 231 of the circular shutter member 230 is engaged with the gear surface 301 of the opening lever 300, opposite to the above-described case of entering, and rotates counterclockwise. Here, the second push portion 238 pushes the second pressing surface 245 so that the pivot shutter member 240 rotates to the original position in which the aperture hole 221 is closed. Here, since the closing operation is performed in the state in which only the outer circumference D3 of the disc D contacts the accommodation surface 232, the information area D2 is safely kept. Also, in this process, as shown in FIGS. 8C and 8D, the fourth push portion 235 pushes the rib 251 to descend along the second inclined surface 213 of the upper case 210. Consequently, as shown in FIGS. 5A and 6A, the aperture hole 221 is closed by the shutter 230 and 240 and the gap g between the outer circumference D3 of the disc D and the outer circumference 230b of the circular shutter member 230 is covered by the disc holder 250 so that the recording surface, that is, the information area D2, is safely protected from foreign material such as dust. Thus, since all passages through which dust can intrude toward the recording surface, that is, the information area D2, when the disc cartridge 200 is ejected from the disc drive, the information area D2 can be prevented from contamination when kept.

In the above shutter closed state, since the step surfaces 239a, 239b, and 239c, and 244, 246, and 247 of the circular shutter member 230 and the pivot shutter member 240 are vertically folded onto each other, when the shutter 230 and 240 are pressed inward the cases 210 and 220 through the aperture hole 221, they are not easily pushed. Thus, the deformation of the shutters 230 and 240 by the external force can be prevented and also the closed state of the aperture hole 221 can be firmly maintained.

Next, FIG. 11 shows a disc cartridge according to a second preferred embodiment of the present invention. The disc cartridge of the preferred embodiment includes cases 410 and 420 for accommodating the disc D, a ring rotator 430 having an accommodation surface 432 on which the outer circumference D3 of the disc D is accommodated and installed to be capable of rotating inside the cases 410 and 420, a shutter 440 for opening/shutting an aperture hole 421 formed in the cases 410 and 420 under the disc D, and a disc holder 421 installed in the cases 410 and 420 to be capable of elevating. The shutter 440 and the disc holder 450 respectively perform opening/shutting and elevating operations by being engaged with rotation of the ring rotator 430 and the detailed descriptions thereof will be made later.

The case includes a lower case 420 where an aperture hole 421 is formed and an upper case 410 where an open hole 411 open to the outside is formed and which is coupled to the lower case 420.

The shutter 440 is installed to be capable of rotating around rotation shafts 423a and 423b provided at the lower case 420 and includes fist and second shutter members 441 and 442 for opening the aperture hole 421 through a gap that is formed as they are separated from each other.

The disc holder 450 ascends when a disc cartridge 400 is inserted into a disc drive (not shown) and descends when the disc





cartridge 400 is ejected therefrom. When raised, the disc holder 450 closely contacts the outer circumference D3 of the disc D and an outer circumference 436 of the ring rotator 430, as shown in FIG. 15B. The disc holder 450 functions as a cover to restrict contamination of the recording surface of the disc D by dust intruding through the open hole 411 and accumulating in the gap g between the outer circumference 436 of the ring rotator 430 and the outer circumference D3 of the disc D. In other words, an interval between the outer circumference of the disc D and the inner surface of the open hole 411 is covered to prevent dust from intruding therein. Since the disc holder 450 during descending presses the disc D toward the accommodation surface 432 of the ring rotator 430, the disc holder 450 has a function of firmly holding the disc D not to move. The disc holder 450 has a ring shape in which a through hole having a diameter greater than the diameter of the non information area D1 at the inner circumference side of the disc D and less than the diameter of the outermost circumference of the disc D is formed at the center thereof. Thus, when the disc holder 450 closely contacts the circumference of the upper surface of the disc D, the upper surface of the disc at the inner side of the through hole is exposed through the open hole 411.

Next, a rotation driving mechanism for rotating the ring rotator 430 includes a gear portion 431 provided at the ring rotator 430 and a locking unit for selectively locking the ring rotator 430. The gear portion 431 is formed to be engaged with the opening gear 300 (refer to FIG. 12A) installed in the disc drive when the disc cartridge 400 is inserted into the disc drive. Since the opening gear 300 is in a fixed state and the ring rotator 430 is in a rotatable state, when the two members are engaged with each other, the ring rotator 430 rotates as shown in FIG. 12B as the disc cartridge 400 enters. The locking unit includes a locking lever 460 rotatably installed at the lower case 420. The locking lever 460, as shown in FIGS. 11, 12A, and 12B, includes a locking

protrusion 461 coupled to a second hooking groove 434 provided at the ring rotator 430, an elastic piece 462 for providing an elastic force to rotate the locking protrusion 461 in a direction in which the locking protrusion 461 is coupled to the second hooking groove 434, and an interference protrusion 463 interference with the opening gear 300 when the disc cartridge 400 is inserted into the disc drive. Thus, in the state in which the external force is not applied, since the locking protrusion 461 is caught by the second hooking groove 461 by the elastic force of the elastic piece 462, the ring rotator 430 cannot rotate. However, when the disc cartridge 400 is inserted into the disc drive, the interference protrusion 463 is interfered with the opening gear 300 and the locking lever 460 rotates. Then, the locking protrusion 461 is released from the second hooking grove 461, removing the locking state, so that the ring rotator 430 can be rotated. In this state, the gear portion 431 is engaged with the opening gear 300 so that the ring rotator 430 is rotated. Reference numeral 301 of the locking lever denotes a gear surface of the opening gear 300 that is engaged with the gear portion 431. Reference numeral 302 denotes a first hooking protrusion inserted into a first hooking groove 433 of the ring rotator 430 at the initial stage in which the disc cartridge 400 is inserted into the disc drive and slightly rotating the ring rotator 430 until the gear surface 301 is engaged with the gear portion 431. Reference numeral 303 denotes a second hooking protrusion for restricting the free rotation of the ring rotator 430 by being inserted into a second hooking groove 434 of the ring rotator 430 when the disc cartridge 400 is completely inserted into the disc drive.

A first engagement mechanism for opening/shutting the first shutter members 441 and 442 by being engaged with the rotation of the ring rotator 430, as shown in FIGS. 11 and 13, includes an engagement slot 443 formed in the first and second shutter members 441 and 442, and an engagement protrusion 437 protruding from the ring rotator 430





and inserted into the engagement slot 443 to be capable of sliding. Thus, as the ring rotator 430 begins to rotate clockwise in the state in which the aperture hole 421 is closed, as shown in FIG. 12A, the engagement protrusion 437 pushes the inner wall surface of the engagement slot 443 to rotate and finally the aperture hole 421 is opened as shown in FIG. 12B. When the ring rotator 420 rotates counterclockwise in this state, the aperture hole 421 returns to the closed state as shown in FIG. 12A.

Next, a second engagement mechanism for elevating the disc holder 450 according to the rotation of the ring rotor 430, as shown in FIGS. 11 and 14, includes an inclined rail 454 spirally formed on the outer circumferential surface of the disc holder 450, and a support member 438 provided at the ring rotator 430 and coupled to the inclined rail 454 to be capable of sliding. Thus, when the ring rotator 430 rotates, the guide groove 438a of the support member 438 slides along the inclined rail 454. Here, the disc holder 450 ascends along a spiral track of the inclined rail 454. That is, when the ring rotator 430 rotates counterclockwise on the drawing, that is, in a direction in which the aperture hole 421 is closed, in the state in which the disc holder 450 closely contacts the disc D, as shown in FIG. 15A, the guide groove 438a of the support member 438 moves from the uppermost end of the spiral inclined rail 454 to the lowermost end thereof. Accordingly, the disc holder 450 installed to be capable of elevating relatively to the ring rotator 430 ascends as much as a difference in height between the uppermost end and the lowermost end of the inclined rail 454, as shown in FIG. 16A. In contrast, when the ring rotator 430 rotates clockwise on the drawing, that is, in a direction in which the aperture hole 421 is closed, the guide groove 438a of the support member 438 moves toward the uppermost end from the lowermost end of the inclined rail 454 and lowers the disc holder 450, thus returning to the original state shown in FIG. 15A. When the disc holder 450 ascends as described above and

shown in FIG. 16A, the disc D is released to be free to rotate, as shown in FIG. 16B. When the disc holder 450 descends as described above and shown in FIG. 15A, the disc holder 450 closely contacts the outer circumference D3 of the disc D and the outer circumference 436 of the ring rotator 430 so that intrusion of dust through the gap g and the free movement of the disc D are prevented.

As shown in FIGS. 11 and 14, a shaft support groove 423 into which a shaft member 452 of the disc holder 450 is inserted to be capable of moving up and down is formed in the lower case 420. A shaft cover portion 412 disposed above the shaft support groove 423 to prevent escape of the shaft member 452 through the open hole 411 is formed at the upper case 410. Thus, the shaft member 452 is supported between the shaft support groove 423 and the shaft cover portion 412 to be capable of pivoting. To pick the disc D out of the cases 410 and 420, the disc holder 450 is vertically rotated around the shaft member 452 to be out of the open hole 411. Then, the outer circumference D3 of the disc D and a contact surface 455 of the disc holder 450 are separated so that the disc D can be picked. Of course, since the inclined rail 454 of the disc holder 450 is caught by the guide groove 438a of the support member 438, the disc holder 450 may be slightly restricted when it is vertically rotated. However, as shown in FIG. 18, by slightly separating the support member 438 using an elastic force, the disc holder 450 can be easily lifted. Reference numeral 453 of the disc holder 450 denotes a grip portion made by forming a plurality of grooves so that a user can easily hold it with fingers. The grip portion 453 can be used as a mark of the upper side of the disc holder 450.

Step surfaces 441a and 441b, and 442a and 442b, vertically folded onto each other, as shown in FIG. 13, are provided at the position were the first and second shutter members 441 and 442 closely contact each other. The reason why the two shutter members 441 and 442 are





folded onto each other at several positions is to prevent the first and second shutter members 441 and 442 raised during the opening and shutting operations to scratch the recording surface of the disc D, and to reduce deformation when a user presses the shutter 440 through the aperture hole 421. That is, when the first and second shutter members 421 and 422 closely contact each other as the aperture hole 421 is closed, the first and second shutter members 421 and 422 are tied together so that, when an external force is applied, deformation of the shutter is prevented compared to the state in which the shutter members 421 and 422 are separated. Also, a protruding piece 442c is provided on the lower surface of the second shutter member 422. The protruding piece 422c protrudes toward the aperture hole 421 viewed from the rear surface thereof and provides a function of a handle so that a user can rotate the second shutter member 422 using a finger. Thus, the shutter can be manually opened by rotating the shutter by catching the protruding piece 442c using a finger in the state in which the interference piece 463 of the locking lever 460 is pressed. In this case, the aperture hole 421 is manually opened by directly rotating the shutter 440. Alternatively, the shutter 440 can be manually opened by means of the first engagement mechanism by rotating the ring rotator 430. That is, a groove 435 exposed outside through an exposing portion 422 of the lower case 420 is formed at the one side of the outer circumference surface of the ring rotator 430, as shown in FIG. 19. Thus, after pressing the interference piece 463 of the locking lever 460, by rotating the ring rotator 430 while pushing the groove 435 with a finger, the shutter 440 is open by beans of the first engagement mechanism of the engagement protrusion 437 and the engagement slot 443. Here, the groove 435 restricts slippery of the finger along the outer circumferential surface of the ring rotator 430.

In the meantime, as shown in FIG. 20, the second shutter member 442 of the first and second shutter members 441 and 442 blocks the

exposing portion 422 under the disc holder 450. Thus, by setting the length and the curvature such that the rotation shaft 423b of the second shutter member 442 is disposed on a center line X of the lower case 420 and the end portion of the other side can contact a wall surface 422a adjacent to the exposing portion 422, intrusion of dust through the exposing portion 422 toward the recording surface of the disc D when the aperture hole 421 is closed can be reduced.

Referring back to FIG. 11, a first connection hole 451 connected to the open hole 411 is formed in the disc holder 450 so that the clamper (not shown) of the disc drive can enter. A second connection hole 444 for connecting a center hole Dc of the disc D and the aperture hole 421 in a closed state, and a raised surface 445 encompassing the second connection hole 444 and closely contacting the no information area D1 at the inner circumference side of the disc D, are formed in the first and second shutter members 441 and 442. Thus, although the open hole 411 and the aperture hole 421 are formed in the upper and lower cases 410 and 420, respectively, and thus the disc D accommodated therein is exposed to the outside, since the disc holder 450 blocks a passage through which dust intrudes toward the recording surface from the outer circumference D3 of the disc D and the raised surface 445 blocks a passage through which dust intrudes toward the recording surface between the non information area D1 at the inner circumference side of the disc D and the first and second shutter members 441 and 442, the recording surface, that is, the information area D2, can be safely protected.

Reference numeral 446 denotes a protrusion further protruding from the raised surface 445 so that the non information area D1 at the inner circumference side of the disc D. When the shutter 440 is closed, the protrusion 446 is disposed in the center hole Dc of the disc D, as shown in FIG. 12A, and does not show any special function. However, when the shutter 440 is open, the protrusion 446 supports the non





information area D1 at the inner circumference side of the disc D, as shown in FIG. 12B. This is to prevent the raised surface 445 from scratching the recording surface of the disc D when the first and second shutter members 441 and 442 are opened.

In the present preferred embodiment, when a disc holder 450' in which the open hole is closed, as shown in FIG. 21, it is effective in preventing contamination by dust not to form the connection hole in the shutter. Instead, in this case, since the clamper of the disc drive cannot enter as described above, as shown in the drawing, a clamping member 470 must be installed at the inner surface of the disc holder 450'. The clamping member 470 includes a ring member 471 installed at the inner surface of the disc holder 450', a clamping holder 472 supported by the outer circumference of the ring member 471, and an iron piece 473 installed at the clamping holder 472 to apply a magnetic attraction with a magnet installed at a turntable (not shown) in the disc drive. However, in this case, since information printed on the upper surface of the disc D cannot be seen, a member covering the open hole is formed of a transparent material so that the upper surface of the disc D can be seen. Reference number 480 of FIG. 11 denotes a write protector.

The disc cartridge 400 in which the disc D is accommodated is inserted into the disc drive in the state in which the first and second shutter members 441 and 442 block the aperture hole 421, as shown in FIG. 12A, and the disc holder 450 covers the gap g between the outer circumference D3 of the disc D and the outer circumference 436 of the ring rotator 430, as shown in FIG. 15B. That is, all passages through which dust can intrude toward the recording surface of the disc D accommodated in the disc cartridge 400, that is, the information area D2, are blocked. When the disc cartridge 400 is inserted, the opening gear 300 installed at the disc drive presses the interference protrusion 463 of the locking lever 460 and the locking lever 460 is rotated so that the locking protrusion 461 and the second hooking groove 434 are unlocked.

Next, the first hooking protrusion 302 of the opening gear 300 is caught by the first hooking groove 433 of the ring rotator 430. When the disc cartridge 400 continues to enter the disc drive in this state, the gear surface 301 of the opening gear 300 is engaged with the gear portion 431 of the ring rotator 430 so that the ring rotator 430 returns to the state shown in FIG. 12B. Here, since only the outer circumference D3 of the disc D contacts the accommodation surface 432 of the ring rotator 430, the information area D2 of the recording surface is hardly damaged during the shutter opening/shutting operation.

As the ring rotator 430 rotates, the opening operation of the aperture hole 421 and the ascending operation of the disc holder 450 are simultaneously performed by the first and second engagement mechanism. That is, when the ring rotator 421 rotates, the engagement protrusion 437 pushes the inner wall surface of the engagement slot 443 to rotate the first and second shutter members 441 and 442 in a direction in which they are separated from each other. Thus, the aperture hole 421 is opened through a gap made between the first and second shutter members 441 and 442. Also, in this process, as shown in FIG. 16A, the guide groove 438a of the support member 438 slides along the inclined rail 454 and pushes the disc holder 450 to ascend. Thus, as shown in FIG. 16B, the disc holder 450 is separated from the disc D so that the disc D can freely rotate. In this state, a turntable (not shown) and a clamper (not shown) of the disc drive enter through the aperture hole 421 and the open hole 411, respectively, and clamp the disc D. Thus, recording/reproduction is performed with respect to the disc D as the turntable rotates. In the meantime, the height that the disc holder 450 separated from the disc D ascends is preferably designed to be double the height that the disc D accommodated on the turntable ascends. That is, when the disc D is clamped, it is raised toward the clamper by the turntable about 1 mm from the accommodation surface 432. Thus, to prevent interference with the disc D, the height that the disc holder





450 ascends is preferably set to be about 2 mm that is double the above height.

In contrast, when the recording/reproducing operation is completed, the turntable and the clamper escape from the disc cartridge 400 and clamping is removed. In this state, as the disc cartridge is ejected from the disc drive, the ring rotator 430 returns to the original position and the aperture hole 421 is closed. That is, the gear portion 431 of the ring rotator 430 is engaged with the gear surface 301 of the opening lever 300, opposite to the above-described case of entering, and rotates counterclockwise. Here, the engagement protrusion 437 pushes the inner wall surface of the engagement slot 443 in the opposite direction to the direction in the case of entering so that the first and second shutter members 441 and 442 rotate to the position in which the aperture hole 421 is closed, as shown in FIG. 12A. Here, since the closing operation is performed in the state in which only the outer circumference D3 of the disc D contacts the accommodation surface 432, the information area D2 is safely kept. Also, in this process, the guide groove 438a of the support member 438 slides along the inclined rail 454 in the opposite direction to the direction in the case of entering and descends the disc holder 450, as shown in FIGS. 15A and 15B. Consequently, the aperture hole 421 is closed by the first and second shutters 441 and 442 and the gap g between the outer circumference D3 of the disc D and the outer circumference 436 of the ring rotator 430 is covered by the disc holder 450 so that the recording surface, that is, the information area D2, is safely protected from foreign material such as dust. Thus, since all passages through which dust can intrude toward the recording surface, that is, the information area D2, when the disc cartridge 400 is ejected from the disc drive, the information area D2 can be prevented from contamination when kept.

In the above shutter closed state, since the step surfaces 441a and 441b, and 442a and 442b, of the first and second shutter members

441 and 442 are vertically folded onto each other, when the shutter 440 is pressed inward the cases 410 and 420 through the aperture hole 421, they are not easily pushed. Thus, the deformation of the shutter 440 by the external force can be prevented and also the closed state of the aperture hole 421 can be firmly maintained.

Industrial Applicability

The above-described disc cartridge of the present invention has the following effects.

First, by blocking all passages through which dust can intrude toward the information area through the gap between the outer circumference of the disc and the non information area at the inner circumference side of the disc, the possibility of contamination of the information area by dust can be reduced.

Second, since the disc holder ascends when used in the disc drive and the disc holder descends and closely contacts the disc when not used, the entire height of the disc cartridge held by the hand of a user is reduced, providing a sense of being slim to the user.

Third, by having the shutter members vertically folded onto each other at several positions, the deformation of the shutter by the external force is prevented and the closed state can be firmly maintained.

Fourth, since the shutter is formed to contact only the outer circumference that is the non information area of the disc, the information area of the disc can be safely kept during the opening/shutting operation of the aperture hole.

Fifth, by separating or rotating the disc holder only from the upper case, a disc can be easily replaced through the open hole.





What is claimed is:

1. A disc cartridge comprising:

a case for accommodating a disc and having an aperture hole formed in one surface of the case so that a recording/reproducing apparatus access a recording surface of the disc and an open hole formed in the other surface to be open to the outside;

a shutter for opening/shutting the aperture hole, installed in the case;

a disc holder installed at the side of the open hole to be capable of moving up and down, and covering a gap between an outer circumference of the disc and an inner surface of the open hole when the disc holder descends; and

a shutter driving mechanism for moving the shutter so that the aperture hole is shut when the disc holder descends.

2. The disc cartridge as claimed in claim 1, wherein the shutter comprises:

a circular shutter member rotatably installed at the case and having an accommodation surface where the outer circumference of the disc is accommodated; and

a pivot shutter member installed to be capable of pivoting in a cut portion formed in the circular shutter member,

wherein the aperture hole is selectively open/shut by the cut portion according to the movement of the circular shutter member and the pivot shutter member.

3. The disc cartridge as claimed in claim 2, wherein the shutter driving mechanism comprises:

a gear portion provided at the circular shutter member and engaged with an opening gear installed in a disc drive when the disc

cartridge is inserted into the disc drive so that the circular shutter member rotates according to the cartridge insertion operation;

an engagement unit for pivoting the pivot shutter member by being engaged with the rotation of the circular shutter member; and

a locking unit for selectively locking the circular shutter member.

4. The disc cartridge as claimed in claim 3, wherein the engagement unit comprises first and second push portions provided at the circular shutter member to be capable of pushing the pivot shutter member, wherein the first push portion pushes the pivot shutter member to pivot as the circular shutter member rotates clockwise and the second push portion pushes the pivot shutter member to pivot as the circular shutter member rotates counterclockwise.

5. The disc cartridge as claimed in claim 3, wherein the locking unit comprises a locking lever installed at the case to be capable of rotating, the locking lever integrally including a locking protrusion coupled to the gear portion, an elastic piece for providing an elastic force so that the locking protrusion rotates in a direction in which the locking protrusion is coupled to the gear portion, and an interference protrusion for unlocking the locking protrusion from the gear portion according to the insertion operation by being interfered with the opening gear when the disc cartridge is inserted into the disc drive.

6. The disc cartridge as claimed in claim 2, further comprising an elevating mechanism for moving the disc holder up and down.

7. The disc cartridge as claimed in claim 6, wherein the elevating mechanism comprises:

a rib protruding form the disc holder;





three and fourth push portions provided at the circular shutter member for pushing the rib during the rotation of the circular shutter member to rotate the disc holder together; and

first and second inclined surfaces provided at the case so that the rib slides and moves up and down during the rotation of the disc holder,

wherein, when the circular shutter member rotates in a direction in which the aperture hole is open, the third push portion pushes the rib to ascend along the first inclined surface and, when the circular shutter member rotates in a direction in which the aperture hole is closed, the fourth push portion pushes the rib to descend along the second inclined surface.

8. The disc cartridge as claimed in claim 7, wherein the third push portion comprises a first push surface for pushing the rib to ascend along the first inclined surface as the circular shutter member begins to rotate, and a second push surface for pushing the rib to ascend to the end of the first inclined surface subsequent to the first push surface.

9. The disc cartridge as claimed in claim 7, wherein a cut groove is formed in the case so that, when the disc holder is inserted through the open hole, the rib pass through the cut groove, and an auxiliary rib is provided at the disc holder to be disposed at the position to block the cut groove when the rib after passing through the cut groove rotates and descends along the second inclined surface.

10. The disc cartridge as claimed in claim 2, wherein a coupling groove is formed in one of the circular shutter member and the pivot shutter member and a coupling protrusion coupled to the coupling groove is formed at the other one thereof, so that the coupling protrusion is inserted into the coupling groove in a state in which the aperture hole is closed.

11. The disc cartridge as claimed in claim 2, wherein a step surface is provided at each of the circular shutter member and the pivot shutter member such that the step surfaces are vertically folded onto each other.

12. The disc cartridge as claimed in claim 2, further comprising a protruding piece protruding from a rear surface of the circular shutter member toward the aperture hole.

13. The disc cartridge as claimed in claim 1, wherein a first connection hole connected to the open hole is formed so that a clamper of the disc drive enters the disc holder, and a second connection hole for connecting a center hole of the disc and the aperture hole in a closed state and a non woven fabric provided around the second connection hole to closely contact a non-information area at the inner circumference of the disc are provided at the shutter.

14. The disc cartridge as claimed in claim 13, wherein the shutter further comprises a protrusion for supporting the non-information area at the inner circumference of the disc.

15. The disc cartridge as claimed in claim 1, wherein a clamping member for claiming the disc is installed at the disc holder.

16. The disc cartridge as claimed in claim 15, wherein the claming member comprises:

a ring member installed at the inner surface of the disc holder;

a clamping holder supported by the entire outer circumference of the ring member; and





a magnetic body installed at the clamping holder to apply a magnetic attraction with a turntable on which the disc is accommodated, in the disc drive.

17. The disc cartridge as claimed in claim 15, wherein the shutter seals the overall aperture hole in a closed state.

18. The disc cartridge as claimed in claim 1, wherein a through hole having a diameter greater than a diameter of the non information area at the inner circumference side of the disc and less than a diameter of the outermost circumference of the disc is formed at the center of the disc holder, and the disc holder has an area closely contacting the disc along the circumference of the upper surface thereof when the disc holder descends.

19. The disc cartridge as claimed in claim 1, wherein a through hole having a diameter greater than a diameter of the non information area at the inner circumference side of the disc and less than a diameter of the outermost circumference of the disc is formed at the center of the disc holder, and the disc holder has an area closely contacting the disc along one side surface thereof when the disc holder descends.

20. A disc cartridge comprising:

a case for accommodating a disc and having an aperture hole formed in one surface of the case so that a recording/reproducing apparatus access a recording surface of the disc and an open hole formed in the other surface to be open to the outside;

a ring rotator rotatably installed at the case, and on which an outer circumference of the disc is accommodated;

a shutter for opening/shutting the aperture hole, installed in the case;

a disc holder installed at the side of the open hole of the case to be capable of moving up and down, and covering a gap between an outer circumference of the disc and an inner surface of the open hole when the disc holder descends; and

a rotation driving mechanism for rotating the ring rotator.

21. The disc cartridge as claimed in claim 20, wherein the rotation driving mechanism comprises:

a gear portion provided at the ring rotator and engaged with an opening gear installed in a disc drive when the disc cartridge is inserted into the disc drive so that the ring rotator rotates according to the insertion operation; and

a locking unit for selectively locking the ring rotator.

22. The disc cartridge as claimed in claim 21, wherein the locking unit comprises a locking lever installed at the case to be capable of rotating, the locking lever integrally including a locking protrusion coupled to the gear portion, an elastic piece for providing an elastic force so that the locking protrusion rotates in a direction in which the locking protrusion is coupled to the gear portion, and an interference protrusion for unlocking the locking protrusion from the gear portion according to the insertion operation by being interfered with the opening gear when the disc cartridge is inserted into the disc drive.

23. The disc cartridge as claimed in claim 20, further comprising a first engagement mechanism for moving the shutter so that the aperture hole is open/shut according to rotation of the ring rotator, and a second engagement mechanism for moving the disc holder up and down according to rotation of the ring rotator.





24. The disc cartridge as claimed in claim 23, wherein the first engagement mechanism comprises an engagement slot formed in the shutter and an engagement protrusion provided at the ring rotator to be inserted into the engagement slot.

25. The disc cartridge as claimed in claim 23, wherein the second engagement mechanism comprises an inclined rail provided spirally at the outer circumferential surface of the disc holder and a support member provided at the ring rotator and coupled to the inclined rail to be capable of sliding,

wherein, when the ring rotator rotates, the support member slides along the spiral inclined rail and ascends the disc holder along a spiral track of the inclined rail.

26. The disc cartridge as claimed in claim 20, wherein a first connection hole connected to the open hole so that a clamper of the disc drive enters is formed in the disc holder, and a second connection hole connecting a center hole of the disc and the aperture hole in a closed state and a raised surface encompassing the second connection hole and closely contacting a non information area at the inner circumference side of the disc are provided at the shutter.

27. The disc cartridge as claimed in claim 26, wherein the raised surface further comprises a protrusion disposed in the center hole of the disc in a state in which the shutter is closed and supporting the non information area at the inner circumference side of the disc in a state in which the shutter is open.

28. The disc cartridge as claimed in claim 20, wherein the shutter comprises first and second shutter members pivoting around a rotation shaft provided at each of the cases to open the aperture hole

through a gap formed as the first and second shutter members are separated away from each other.

29. The disc cartridge as claimed in claim 28, wherein step surfaces vertically folded onto each other are provided at the first and second shutter members.

30. The disc cartridge as claimed in claim 29, wherein a protruding piece protruding toward the aperture hole is provided at a rear surface of at least one of the first and second shutter members.

31. The disc cartridge as claimed in claim 20, wherein an exposing portion for exposing one side of the outer circumferential surface of the ring rotator is formed at the case, and at least one groove is formed in the outer circumferential surface of the ring rotator exposed through the exposing portion.

32. The disc cartridge as claimed in claim 20, wherein the case comprises a lower case in which the aperture hole is formed and an upper case in which the open hole is formed, and

a shaft member supported to be capable of pivoting between a shaft support groove formed in the lower case and a shaft cover portion provided at the upper case is provided at the disc holder.

33. The disc cartridge as claimed in claim 20, wherein a claming member for clamping the disc is installed at the disc holder.

34. The disc cartridge as claimed in claim 33, wherein the claming member comprises:

a ring member installed at the inner surface of the disc holder;





a clamping holder supported by the entire outer circumference of the ring member; and

a magnetic body installed at the clamping holder to apply a magnetic attraction with a turntable on which the disc is accommodated, in the disc drive.

35. The disc cartridge as claimed in claim 20, wherein a through hole having a diameter greater than a diameter of the non information area at the inner circumference side of the disc and less than a diameter of the outermost circumference of the disc is formed at the center of the disc holder, and the disc holder has an area closely contacting the disc along the circumference of the upper surface thereof when the disc holder descends.

36. The disc cartridge as claimed in claim 20, wherein a through hole having a diameter greater than a diameter of the non information area at the inner circumference side of the disc and less than a diameter of the outermost circumference of the disc is formed at the center of the disc holder, and the disc holder has an area closely contacting the disc along one side surface of the disc when the disc holder descends.

FIG. 1

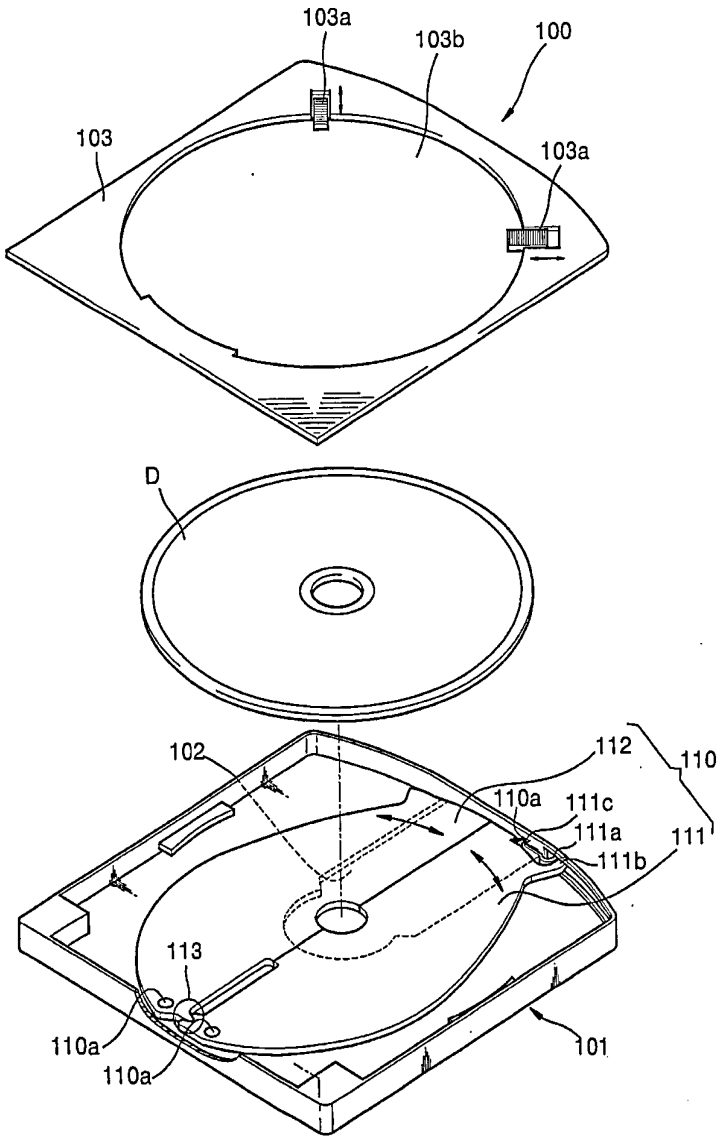
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FIG. 2A

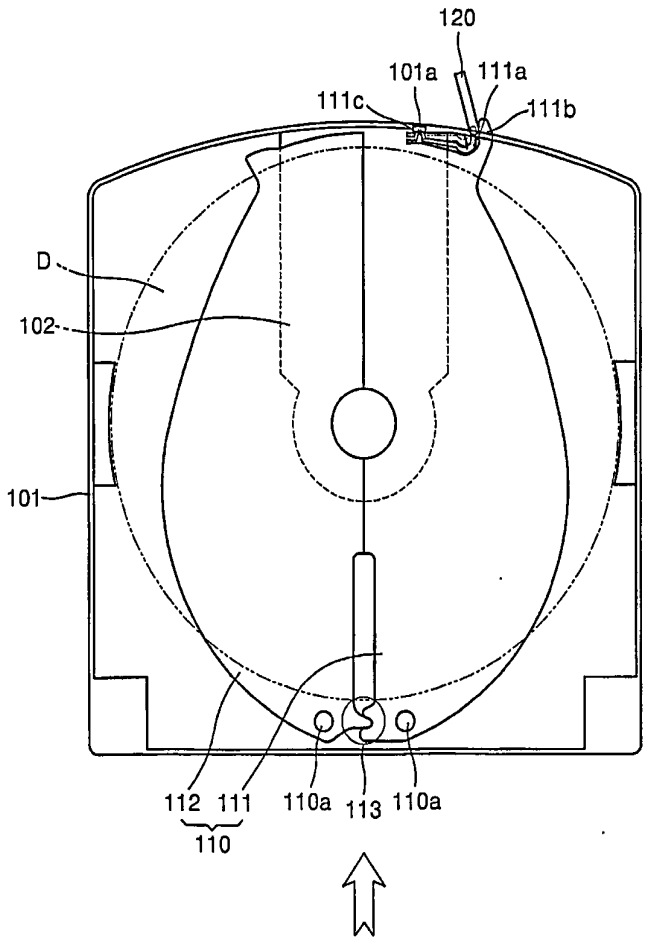
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FIG. 2B

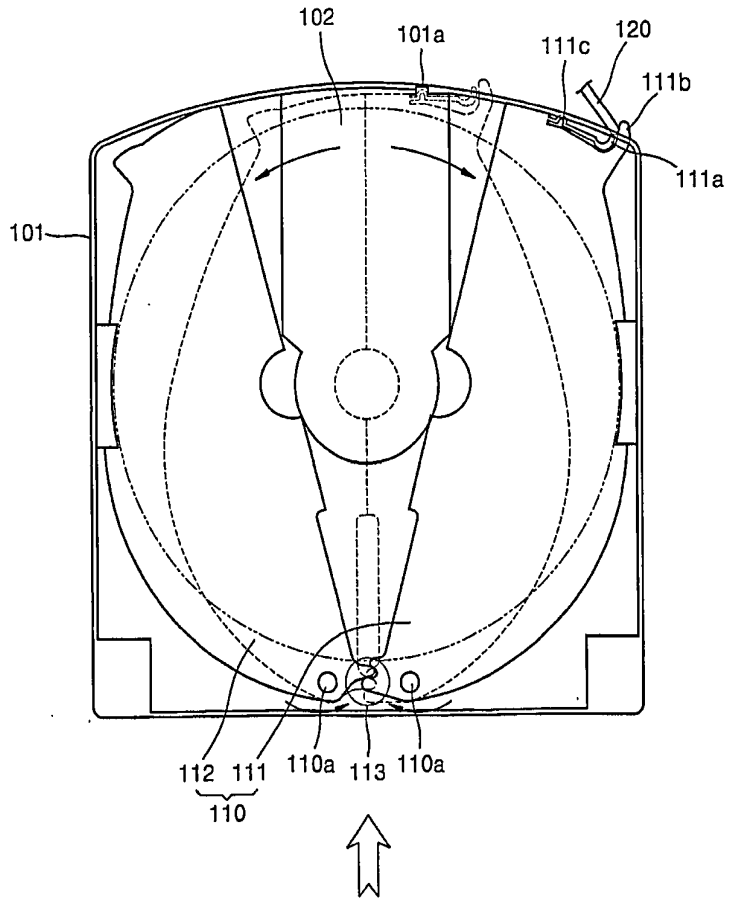
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FIG. 3

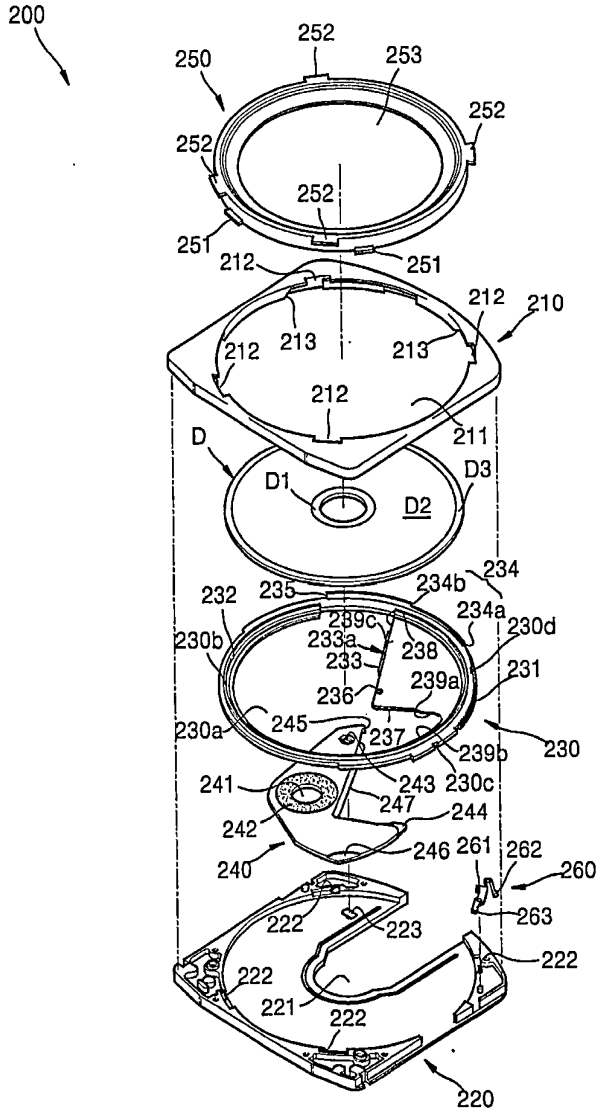
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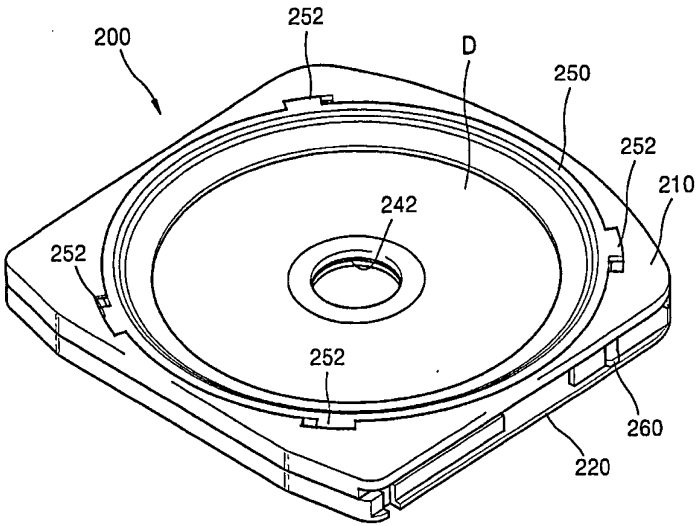
FIG. 4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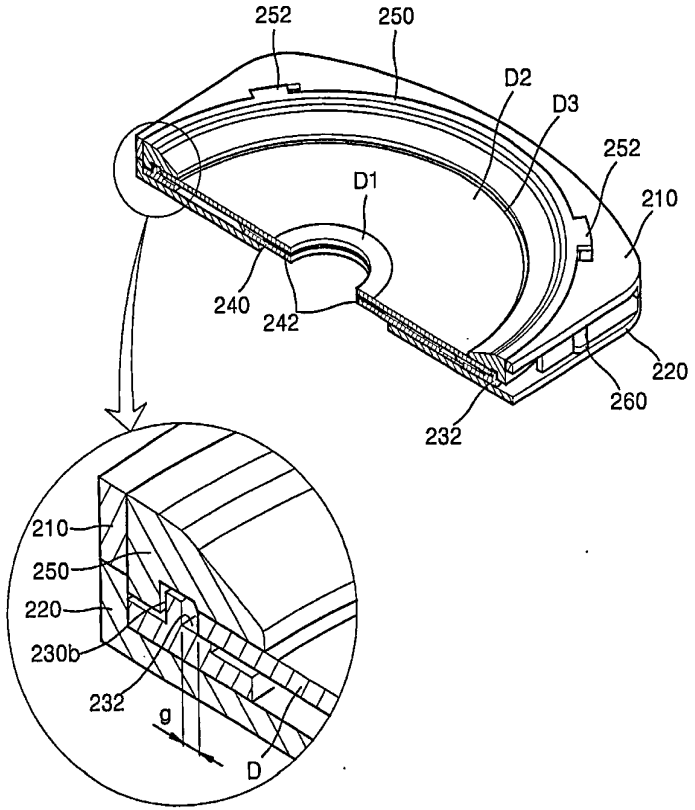
220





FIG. 5A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D3
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D1
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242
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232
210
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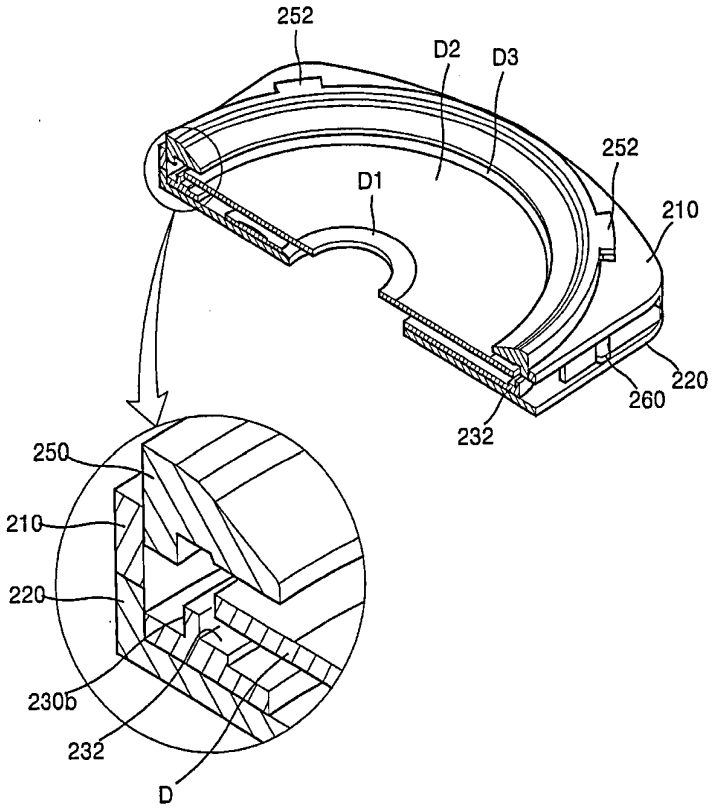
220
230b
232
g
D

FIG. 5B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D3
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D1
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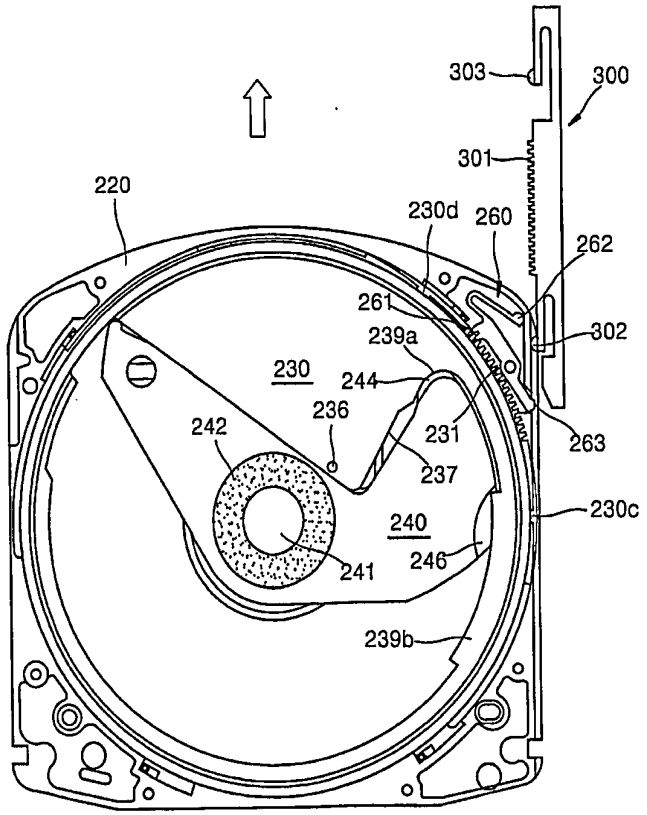
250
210
220
230b
232
D



FIG. 6A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230d
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239a
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236
242
231
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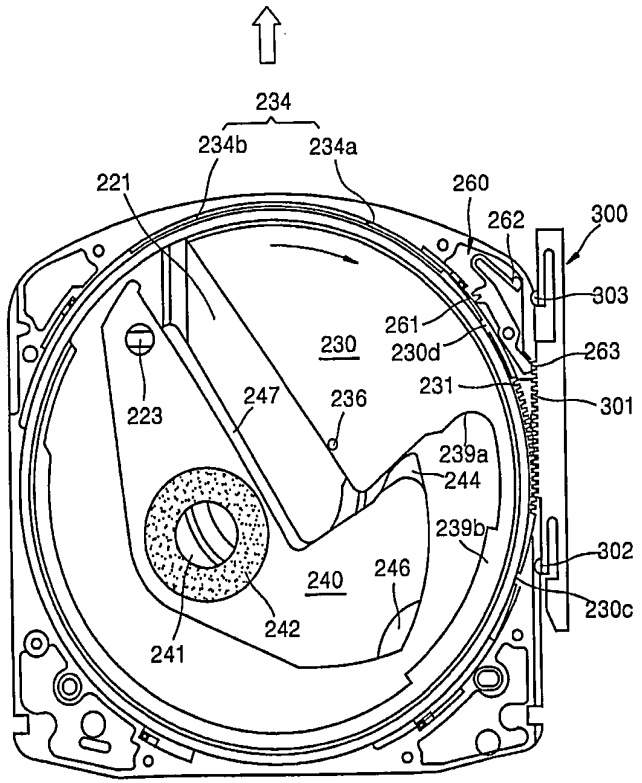
237
240
230c
241
246
239b

FIG. 6B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234a
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261
230
230d
263
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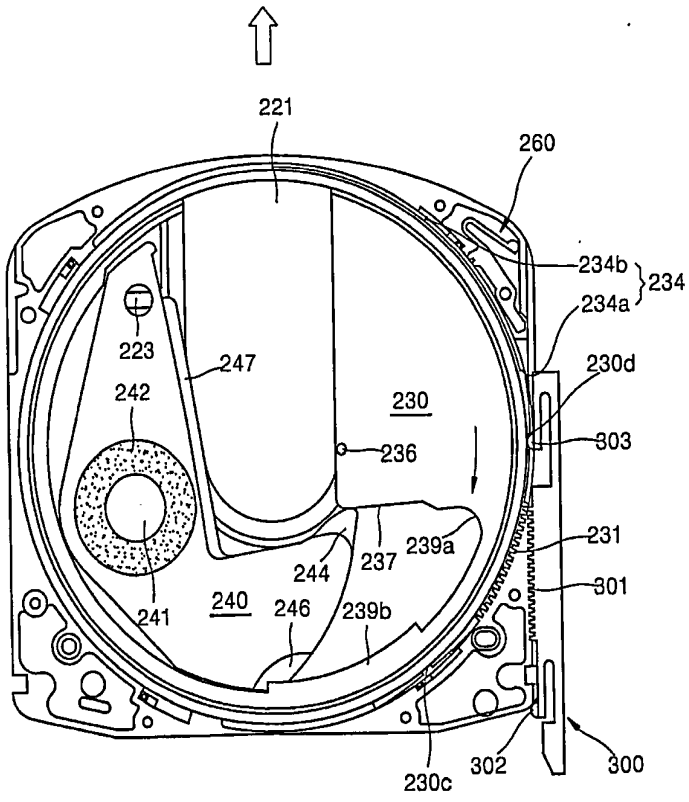
301
223
247
236
239a
244
239b
302
240
246
230c
242
241





FIG. 6C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234a
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239a
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301
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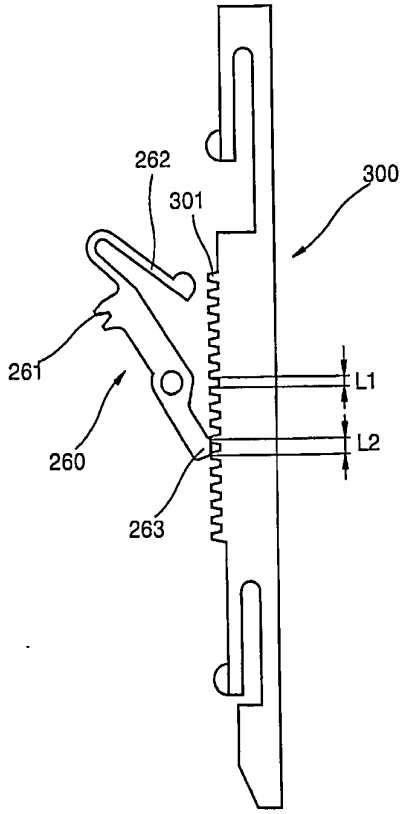
240
246
239b
230c
302
300

FIG. 6D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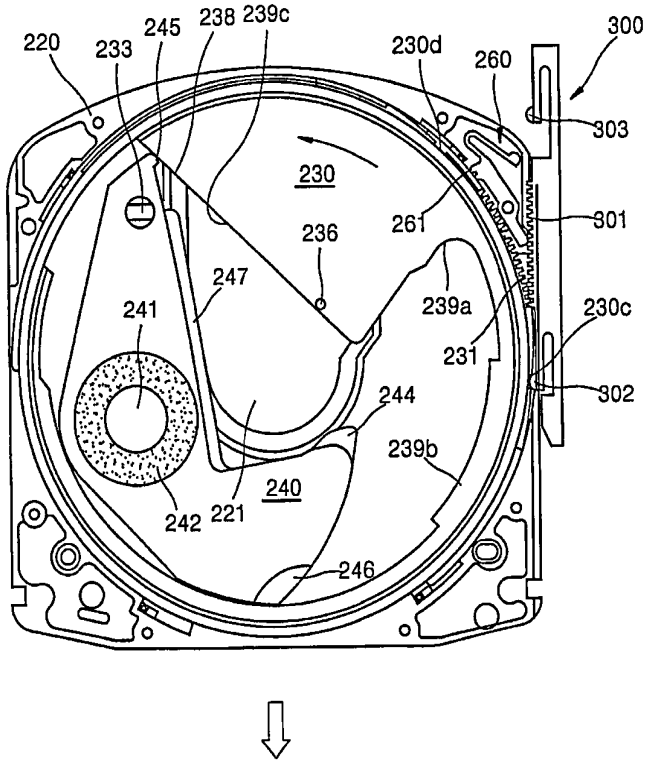
260
263
L1
L2





FIG. 7A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302
239b
240
242
221
246

FIG. 7B

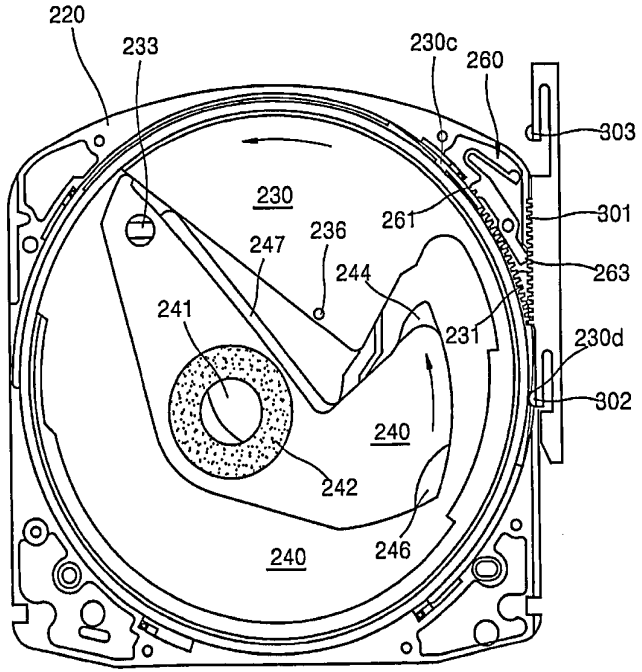
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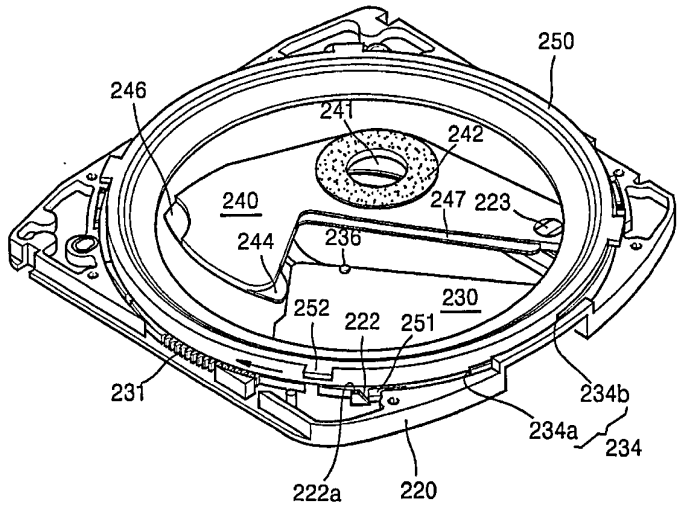
FIG. 8A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251
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234b
234a
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222a
220

FIG. 8B

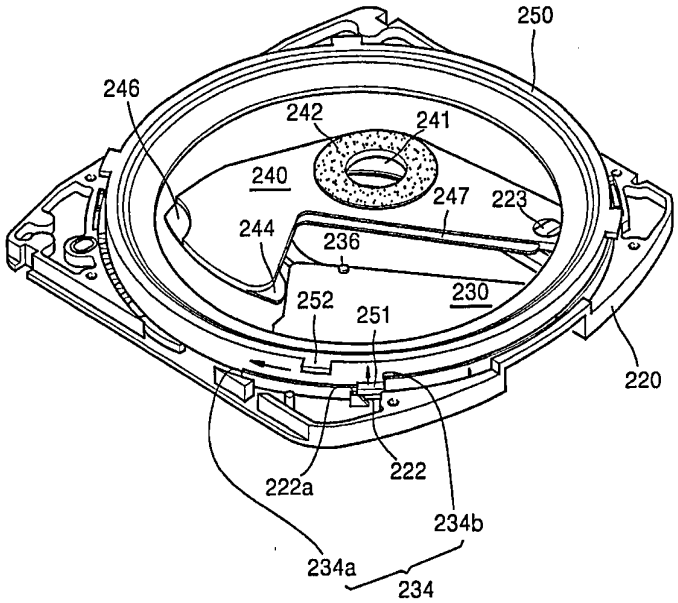






FIG. 8C

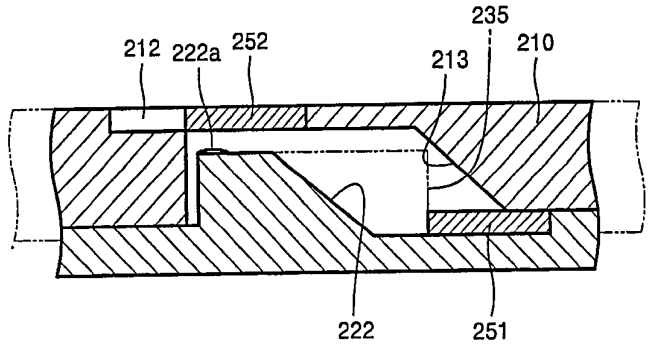


FIG. 8D

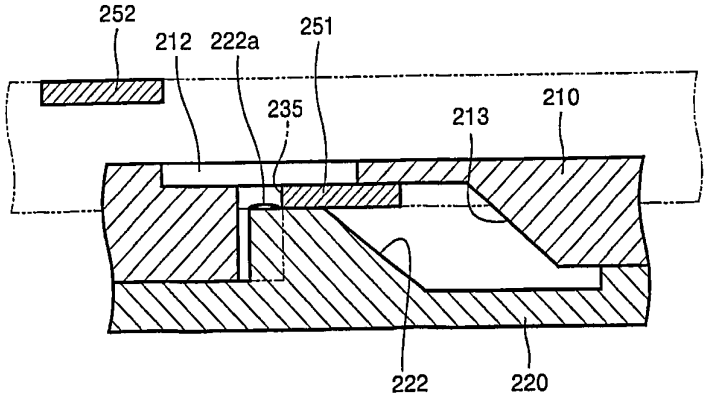

FIG. 9

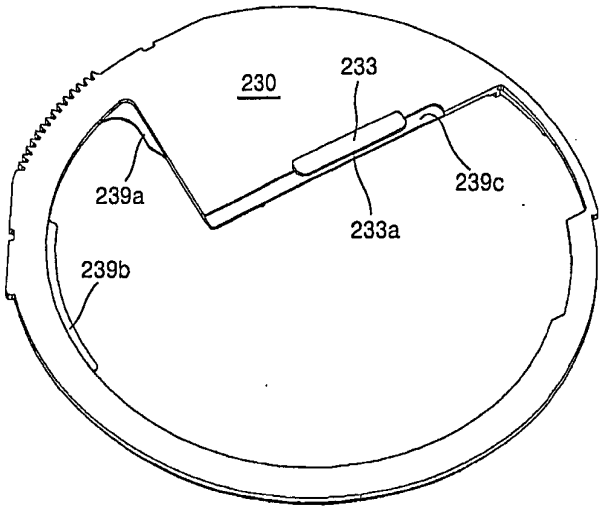


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FIG. 10

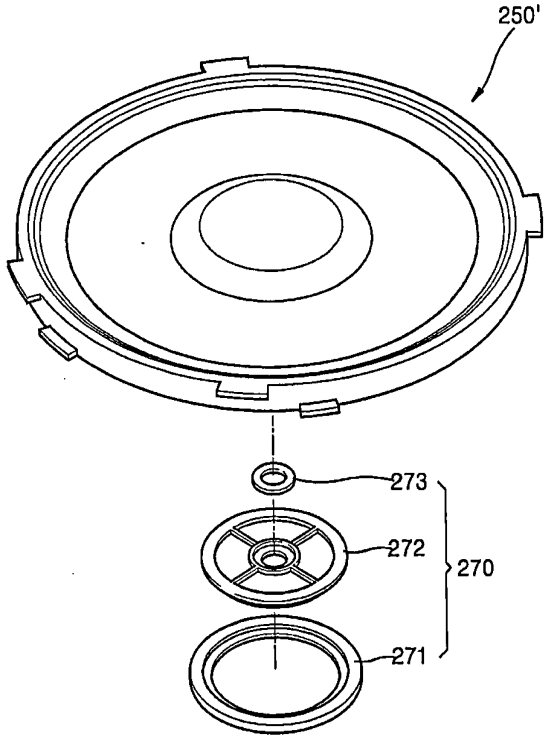

FIG. 11

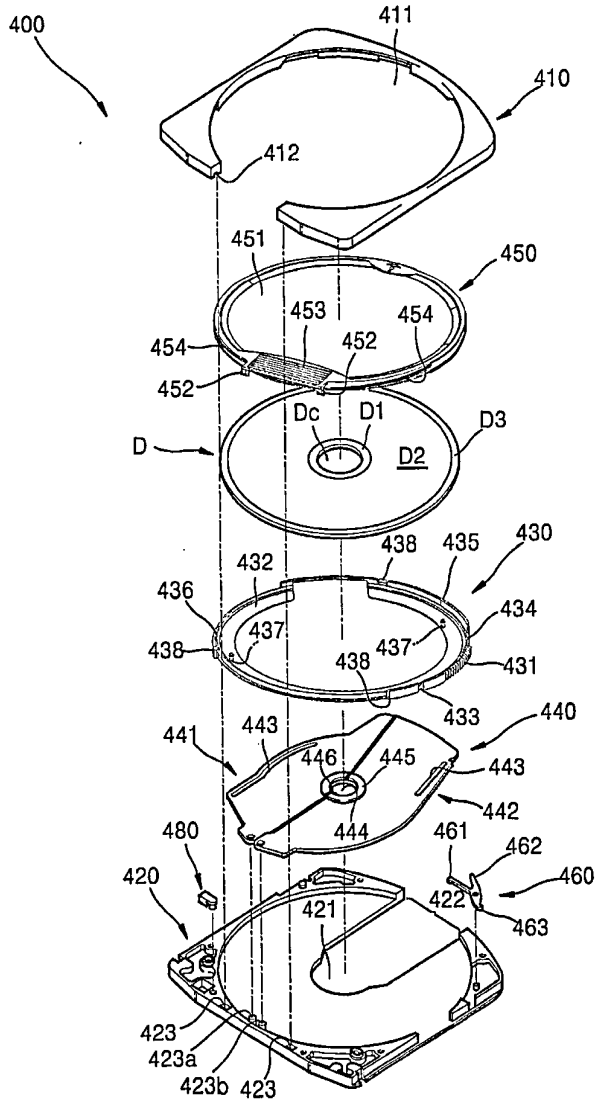






FIG. 12A

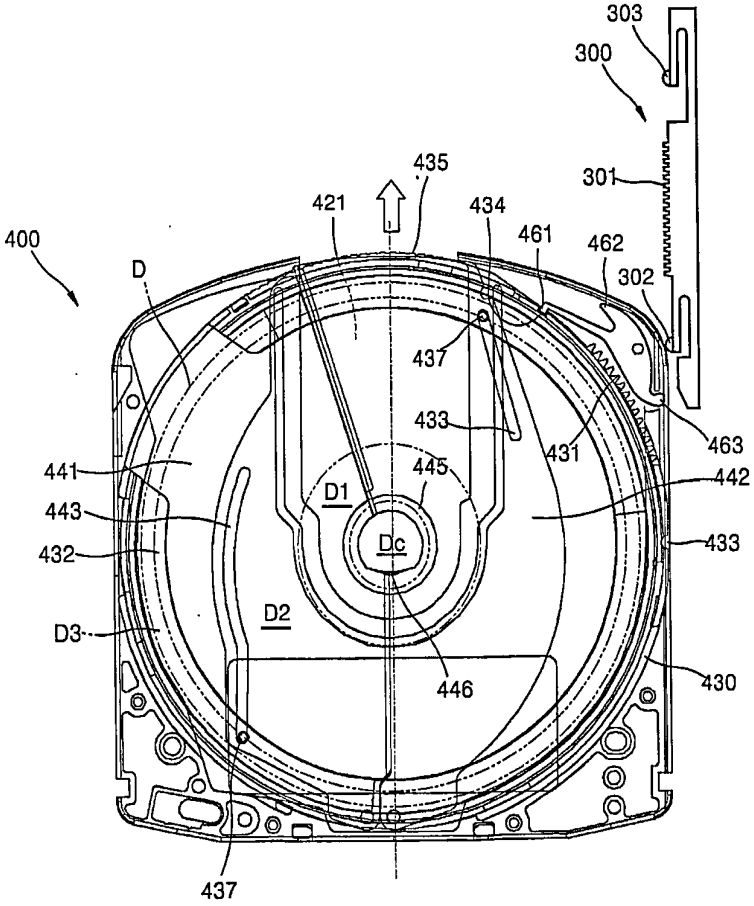

FIG. 12B

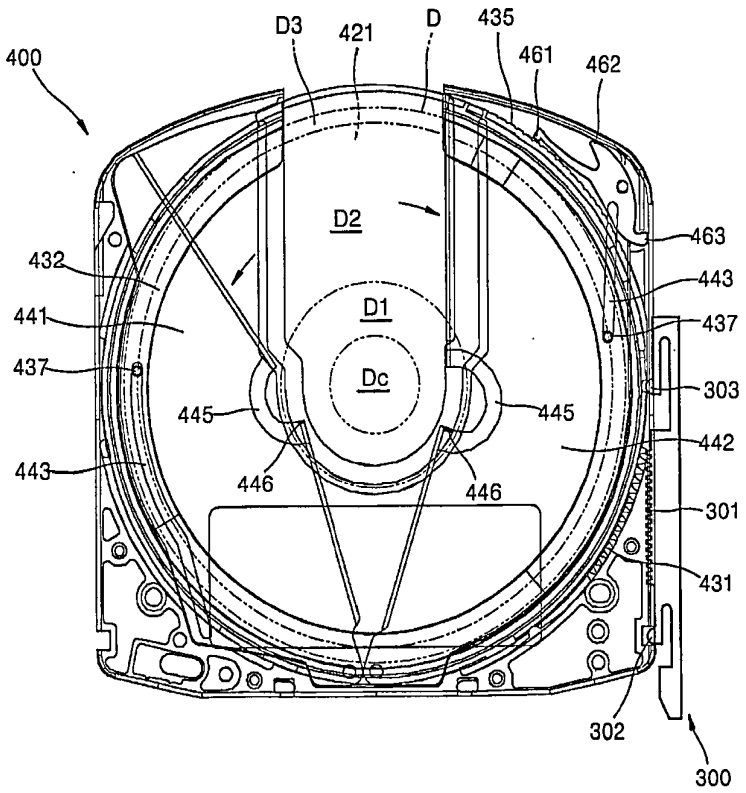






FIG. 13

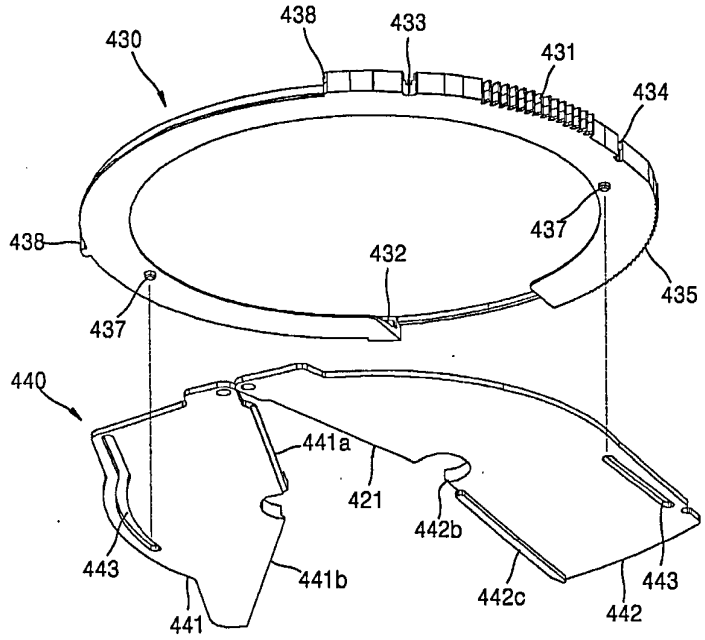

FIG. 14

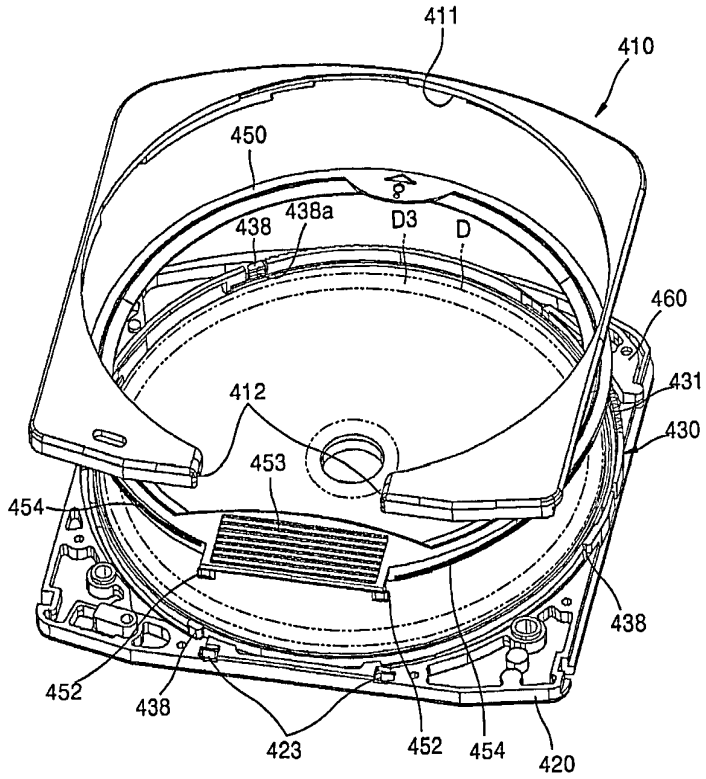






FIG. 15A

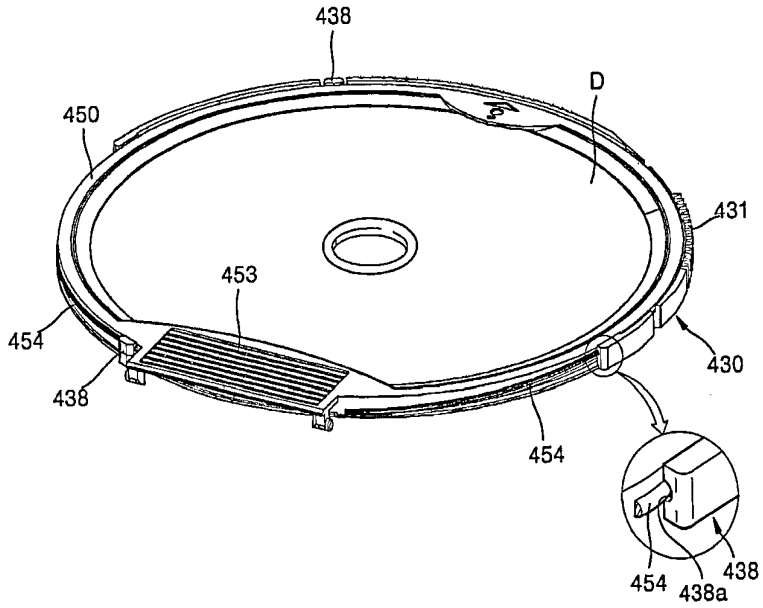

FIG. 15B

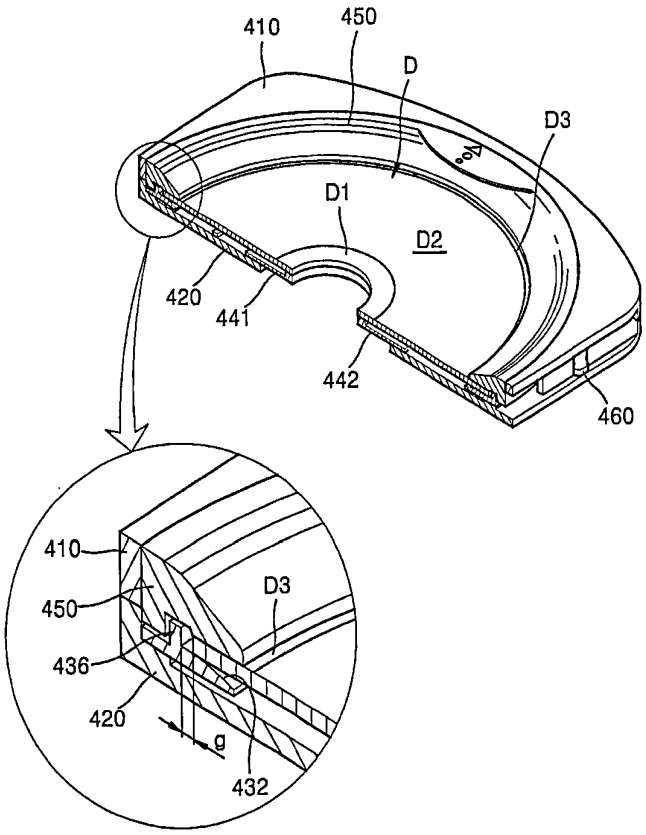






FIG. 16A

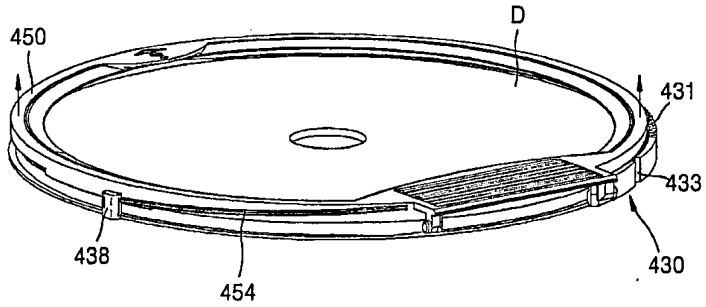

FIG. 16B

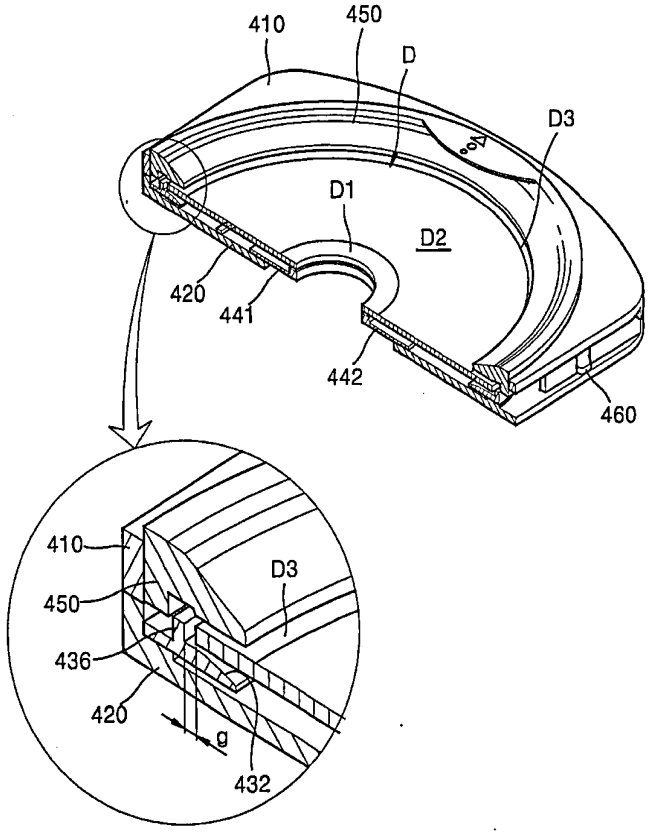






FIG. 17

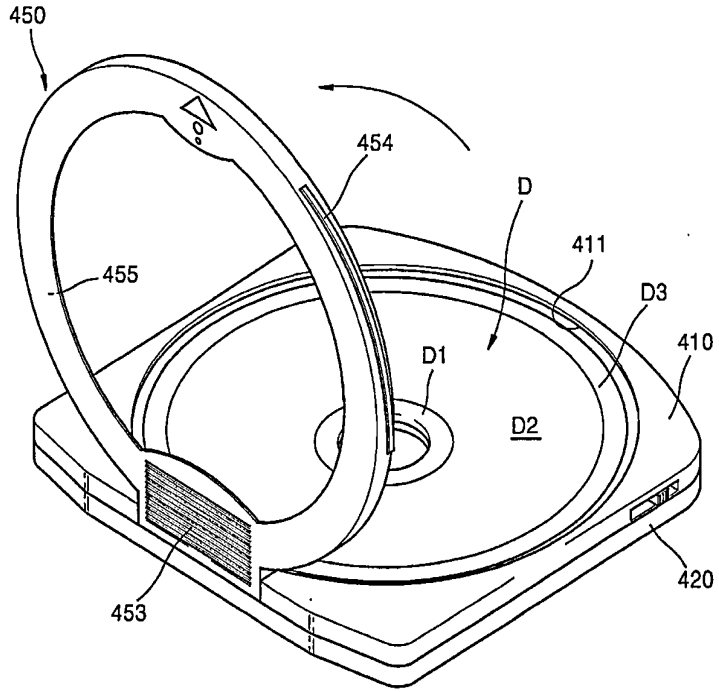

FIG. 18

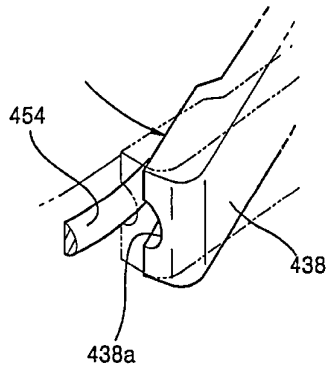


FIG. 19

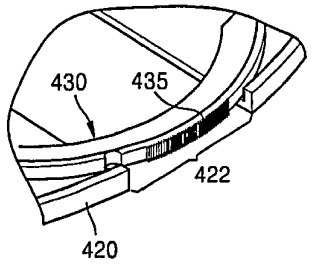


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FIG. 20

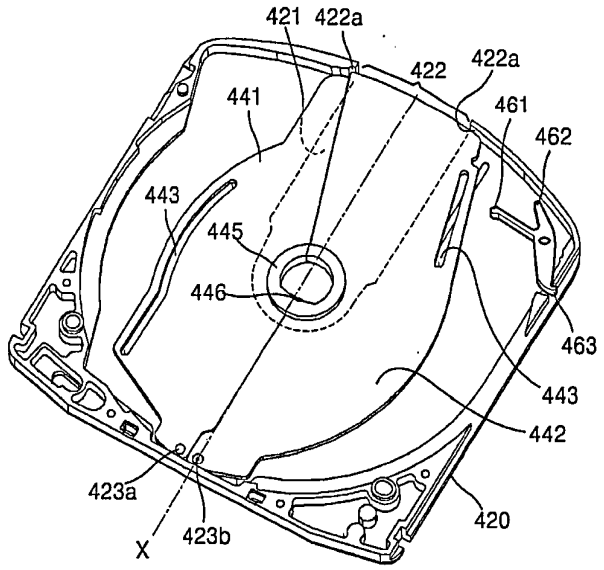
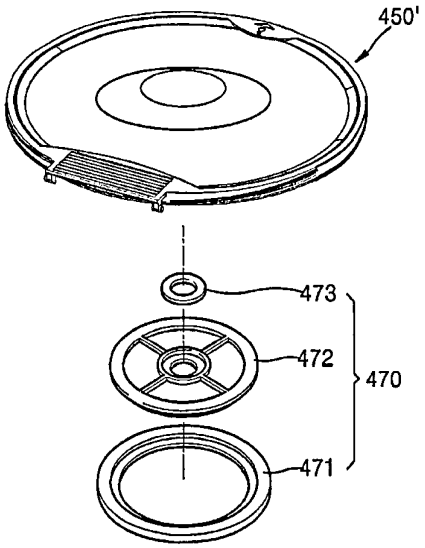


FIG. 21




INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR03/00293

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 G11B 23/03

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G11B23/03

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
KR, JP : classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
"disk catridge", "disk case"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| Y | US 5278717 A(TDK CO) 11 Jan 1991<br>see the abstract, Figure 1 ~ Figure 7 | 1~17 |
| Y<br>A | JP P1999-345475 A(SONY CORP) 14 Dec 1999<br>see the whole document | 1~19,<br>20~36<br>1~17 |
| A | JP P2001-283556 A(SONY CORP) 12 Oct 2001<br>see the whole document | |

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 28 MAY 2003 (28.05.2003) | 28 MAY 2003 (28.05.2003) |

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KIM, Byung Woo
Telephone No. 82-42-481-5695

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/KR03/00293

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| US 5278717 A | 1994. 1. 11 | JP 5278717 A2 | 1993.10. 26 |
| JP P1999-345475A | 1999.12.14 | none | - |
| JP P2001-283556A | 2001.10.12 | none | - |

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